



# 4-H ENGINEERING PROJECT



## 4-H THRIVE

### Help Youth:

#### Light Their Spark

A spark is something youth are passionate about; it really fires them up and gives them joy and energy. Help youth find how this project excites them.

#### Flex Their Brain

The brain grows stronger when we try new things and master new skills. Encourage youth effort and persistence to help them reach higher levels of success.

#### Reach Their Goals

Help youth use the GPS system to achieve their goals.

**Goal Selection:** Choose one meaningful, realistic and demanding goal.

**Pursue Strategies:** Create a step-by-step plan to make daily choices that support your goal.

**Shift Gears:** Change strategies if you're having difficulties reaching your goal. Seek help from others. What are youth going to do when things get in their way?

#### Reflect

Ask project members how they can use their passion for this project to be more confident, competent and caring. Discuss ways they can use their skills to make a contribution in the community, improve their character or establish connections.

Engineering is a systematic and iterative approach to addressing human needs and wants, by designing, building, and testing tools, processes, and systems. Through engineering projects, youth learn about the iterative engineering design process, attributes of design, impacts of systems, and effects of technology on the environment.

- Identify and define a problem, its constraints, and goals/criteria a solution must meet
- Develop possible solutions; test and optimize the design solution.
- Engage in engineering practices: defining problems, using models, carrying out investigations, analyzing/interpreting data, using math, designing solutions, engaging in argument from evidence, and communicating information.

#### Starting Out *Beginner*

- Experience the engineering design process.
- Record designs and testing in an engineering notebook.
- Learn about the types and safety considerations of tools and equipment.
- Learn about form and function and the role of materials in engineering design.
- Evaluate design solutions against relevant criteria.

#### Learning More *Intermediate*

- Learn about engineering fields and careers.
- Make connections between human issues and how engineering can help provide solutions.
- Start to think about systems thinking and how individual parts of a system work together.
- Learn about the selection, development, and use of tools.

#### Exploring Depth *Advanced*

- Identify real-life issues and their constraints and design a tool to help solve the issue.
- Explore engineering in context of disciplines: agriculture, energy, medical, and others.
- Explore the interactions of technology (created using engineering) and their effects on the world.
- Dig deeper into ethics, equity, and responsibility of engineers.

The activities above are ideas to inspire further project development. This is not a complete list.



# Expand Your Experiences!

## Science, Technology, Engineering, and Mathematics

- Go on a field trip of an engineering company or organization.
- Build your own measurement tool in order to conduct a scientific investigation.
- Research and discuss with other members the relationship between science and engineering—how are they different? How are they similar?

## Healthy Living

- Learn about the safety of a tool or equipment and present to the other project members.
- Identify a health-related need in your home or community and then design, build, and test a device that can help meet that need.
- Learn about the engineering behind a piece of medical equipment.

## Citizenship

- Select one tool and trace its lineage. When was that tool first introduced? Who created it and for what purpose? What effect has adoption of that tool had on society?
- Identify a community need and then plan and implement a service learning project to address that need using the experience you've gained in this project.

## Leadership

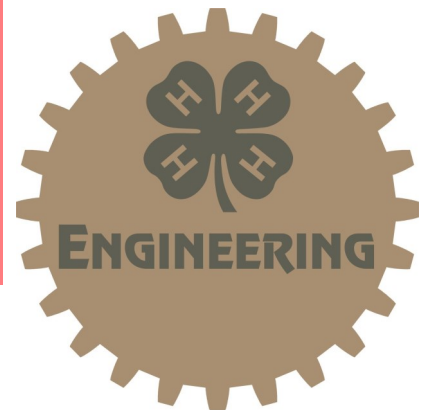
- Serve as a Junior or Teen Leader for the Engineering project.
- Lead an engineering activity at a 4-H club meeting for younger members.
- Serve as the lead for a service learning project related to engineering, form a group of fellow members, and submit a request for funding.

## Resources

- National 4-H Engineering & Technology  
[www.4-h.org/youth-development-programs/4-h-science-programs/engineering-technology/](http://www.4-h.org/youth-development-programs/4-h-science-programs/engineering-technology/)
- International Technology and Engineering Educators Association (ITEEA)  
<http://www.iteaconnect.org/>
- 4-H Clover Safe Notes  
[safety.ucanr.org/4-H\\_Resources/](http://safety.ucanr.org/4-H_Resources/)
- Design Squad (PB)  
<http://pbskids.org/designsquad>
- Maker Education Initiative  
<http://www.makered.org/>
- eGFI: Dream Up the Future  
<http://www.egfi-k12.org/>
- Engineer Girl  
<http://www.engineergirl.org/>
- Autodesk Education  
<http://www.autodesk.com/education/student-software>
- National Center for Women and Information Technology  
<https://www.ncwit.org/>
- Techbridge: Inspire a girl to change the world  
<http://www.techbridgegirls.org/>

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Connections & Events	Curriculum	4-H Record Book
<p><b>Presentation Days</b> – Share what you've learned with others through a presentation.</p> <p><b>Field Days</b> – At these events, 4-H members may participate in a variety of contests related to their project area.</p> <p>Contact your UC Cooperative Extension Office to determine additional opportunities available, such as a field day.</p>	<ul style="list-style-type: none"> <li>• 4-H Robotics: Engineering for Today and Tomorrow <a href="http://www.4-h.org/robotics/">www.4-h.org/robotics/</a></li> <li>• TechXcite: Discover Engineering <a href="http://techxcite.pratt.duke.edu/">techxcite.pratt.duke.edu/</a></li> <li>• 4-H The Power of the Wind <a href="http://www.4-h.org/curriculum/wind/">www.4-h.org/curriculum/wind/</a></li> <li>• Design It! <a href="http://npass2.edc.org/resources/design-it">npass2.edc.org/resources/design-it</a></li> <li>• Exploratorium, the Tinkering Studio projects <a href="http://tinkering.exploratorium.edu/">tinkering.exploratorium.edu/</a></li> </ul>	<p>4-H Record Books give members an opportunity to record events and reflect on their experiences. For each project, members document their experiences, learning and development.</p> <p>4-H Record Books also teach members record management skills and encourage them to set goals and develop a plan to meet those goals.</p> <p>To access the 4-H Record Book online, visit <a href="http://ucanr.edu/orb/">http://ucanr.edu/orb/</a></p>



## University of California Agriculture and Natural Resources

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### Publication 8607

ISBN-13: 978-1-62711-037-2

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An electronic copy of this publication can be found at the ANR Communication Services catalog website, <http://anrcatalog.ucanr.edu/>. This publication has been anonymously peer reviewed for technical accuracy by University of California scientists and other qualified professionals. This review process was managed by ANR Associate Editor for Human and Community–Youth Development Lynn Schmitt-McQuitty.

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